

**Integrated Hatchery Operations Team (IHOT)**

**Hatchery Evaluation Report**

**Spring Creek National Fish Hatchery  
- Tule Fall Chinook**

**MAY 1996**



## **HATCHERY EVALUATION REPORT**

### **SPRING CREEK NATIONAL FISH HATCHERY - TULE FALL CHINOOK**

#### **An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures**

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# CONTENTS

Section 1 Executive Summary .....	1-1
Section 2 Facility Description .....	2-1
Section 3 Compliance Status .....	3-1
Section 4 Remedial Actions .....	4-1
Section 5 Hatchery Contribution to Fisheries, Spawning Grounds and Hatcheries ....	5-1
Section 6 Annual Operating Expenditures .....	6-1

## List of Tables

### Table

1	Compliance with Performance Measures - Spring Creek National Fish Hatchery (Tule Fall Chinook)
2	Remedial Actions Required - Spring Creek National Fish Hatchery (Tule Fall Chinook)
3	Hatchery Contribution to Fisheries, Spawning Grounds and Hatcheries - Spring Creek National Fish Hatchery (Tule Fall Chinook)
4	Annual Operating Expenditures - Spring Creek National Fish Hatchery (Tule Fall Chinook)



## **Executive Summary**

This report presents the findings of the independent audit of the Spring Creek National Fish Hatchery (Tule Fall Chinook). The hatchery is located along the Columbia River at Underwood, Washington, approximately 30 miles upstream of Bonneville Dam. The hatchery is used for adult collection, egg incubation, and rearing of Tule Fall chinook.

The audit was conducted in April 1996 as part of a two-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

### **Background**

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) Strategy for Salmon and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit

focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)*. That document is the source for the performance measures that are the basis of this audit.

## **The Audit Process**

The audit was based on the facility management's response to a 98-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters sources
- The hatchery manager was asked to fill out and return the audit form
- A 1-2 day site audit inspection visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.
- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.



## **Spring Creek National Fish Hatchery (Tule Fall Chinook) Audit Results**

The Spring Creek National Fish Hatchery facility includes 44 Burrows ponds for adult holding and rearing, a circular ØshowÓ pond, and incubation facilities. Spring Creek National Fish Hatchery was constructed in 1900 and began operating in 1901. It was remodeled in 1955 under Mitchell Act authorization as part of the Columbia River Fisheries Development Program. In 1970, the U.S. Army Corps of Engineers razed and remodeled most of the facility as partial mitigation for fishery losses caused by construction of the John Day Dam.

The hatchery was in compliance with the majority of the performance measures. The audit found that the hatchery did not have information on some of the chemistry and contaminant parameters. In the area of facilities requirements, the release facility stresses the fish too much, eggs cannot be water hardened in iodophor, and the hatchery water may be too warm during the May release. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Spring Creek National Fish Hatchery (Tule Fall Chinook Program) requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in order of occurrence on the questionnaire without intent of ranking or otherwise assigning priority:

- Monitor chemistry parameters on routine basis
- Monitor contaminants on routine basis
- Present release facility stresses the fish too much
- Modify incubation water supply to allow water hardening of eggs in iodophor
- Need ability to adjust water temperatures during May releases
- Develop genetics monitoring and evaluation plan for IHOT Operations Plan

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 2, Section 4) were not listed above.

## Facility Description

**Name:** Spring Creek National Fish Hatchery  
**Stock/Species:** Tule Fall Chinook  
**Operating Agency:** U.S. Fish & Wildlife Service  
**Funding Agency:** U.S. Fish & Wildlife Service  
**Location:** Spring Creek NFH is located on the north side of the Columbia River at Underwood, Washington, approximately 30 miles upstream of Bonneville Dam at an elevation of 93 feet above sea level.  
**Address:** Spring Creek National Fish Hatchery  
Mile Post 61.75 R  
State Road 14  
Underwood, WA 98651  
  
**Hatchery Manager:** Mr. Ed LaMotte  
**Phone** (509) 493-1730  
  
**Fax:** (509) 493-2980  
**Purpose:** Spring Creek NFH was constructed in 1900 and began operating in 1901. It was remodeled in 1955 under Mitchell Act authorization as part of the Columbia River Fisheries Development Program. In 1970, the U.S. Army Corps of Engineers razed and remodeled most of the facility as partial mitigation for fishery losses caused by construction of the John Day Dam.

**Production Goal:**

This hatchery provides fish to the ocean and river fisheries.  
15 to 30 million fish to a smolt size of 35 to 110/lb for release in  
March, April, and May. Fish in excess of the hatchery's rearing  
capacity are placed in large holding ponds and volitionally released in  
the Bonneville Pool starting in February.

**Water Supply:**

A series of springs north of State Road 14 (2,250 to 4,000 gpm)

A well used to adjust rearing temperature (1000 gpm)

Reuse system (30,000 gpm)

**Facilities:**

Incubation: 292 16-tray vertical stack incubator (do not use top tray)

Adult Holding 44 Burrows ponds (3,332 cf each)

Raceways 44 Burrows ponds (3,332 cf each)

Ponds 1 circular "show" pond

## Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (referred to as *IHOT 1995* in this report). The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audited included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 98 page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Section 7 includes general information needed for the audit:

Section 1      Performance Measures for Program Objectives (PMs 1-4)

Section 2      Performance Measures for Facility Requirements (PMs 5-15)

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Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

Section 3	Performance Measures for Hatchery Practices (PMs 16-25)
Section 4	Performance Measures for Fish Health Policy (PMs 26-34)
Section 5	Performance Measures for Ecological Interactions (PMs 35-38)
Section 6	Performance Measures for Genetics Policy (PMs 39-43)
Section 7	Performance Measures for General Information (PMs General 1-2)

Several performance measures are repeated in various sections of the audit. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by light gray shading.

## The Hatchery Audit Process

The hatchery audit will be conducted over a two-year period that concludes in 1997. This report covers phase one of the audit, which consists of an audit of four hatcheries and seven species or stocks of fish. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and on-site visits. The site visits were conducted from March 4 to March 8.

The following is the five step audit process:

1. Information was obtained from headquarters sources.
2. The hatchery manager was asked to fill out and return the **Audit Form**.

3. A 1-2 day site audit inspection visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.
4. A **Compliance Report** was developed to document the compliance status of each performance measure. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative.
5. This information was used to develop a draft **Hatchery Evaluation Report**. Based on review and comments of this prototype document, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

## **Compliance Status of Spring Creek National Fish Hatchery (Tule Fall Chinook)**

This section documents the compliance status of the Spring Creek National Fish Hatchery (Tule Fall Chinook). Each performance measure is presented in a table taken from the audit form (Table 1). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4, where the cost of the required remedial actions is also presented.



**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) With Performance Measures**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#1	Are the hatchery programs outlined in a subbasin management plan?		4			Columbia Basin System Planning Production Plan, U.S. vs. Oregon, Columbia River Fish Management Plan	
#2	Is the hatchery operating under a current hatchery operational plan?  Is it understood by staff?  Is it being followed?		4  4  4			IHOT & Spring Creek 5-Year Production Plan	
#3	Is a hatchery monitoring and evaluation plan in place?		4			Hatchery Monitoring and Evaluation Plan	Include Monitoring and Evaluation Plan in IHOT Operations Plan
#4	Specific performance measures include:						
#4a	Adult contribution to fisheries, spawning grounds and hatchery	4					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#4b	<b>Adult pre-spawning survival as compared with established goal</b>		4			In compliance 5 out of last 5 years	
#4c	<b>Egg-take as compared with established hatchery goal</b>		4			In compliance 5 out of last 5 years	
#4d	<b>Green-egg-to-eyed-egg survival as compared with established goal</b>		4			No goal listed in IHOT Operations Plan	
#4e	<b>Eyed-egg to fry survival as compared with established goal</b>		4			No goal listed in IHOT Operations Plan	
#4f	<b>Fry-to-smolt survival as compared with established goal</b>		4			Review of records	
#4g	<b>Production as compared with established goal</b>		4			Review of records	
#4h	<b>Percent survival (smolt to adult) as compared with established goal</b>				4	In compliance 0 out of last 2 years	Need improved ocean survival

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#4i	Number of eggs, fry, fingerlings, smolts and/or adults to meet basinwide needs	4					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#5	<b>Water quality</b>						
#5a	<b>Temperature</b>						
	Do your water temperatures meet the criteria for spawning?		4			Review of records/Discussion	
	Do your water temperatures meet the criteria for incubation?		4			Review of records/Discussion	
	Do your water temperatures meet the criteria for rearing?		4			Review of records/Discussion	
#5b	<b>Dissolved gases</b>						
	Is the oxygen level near saturation?		4			Review of records/Discussion	
	Is the dissolved nitrogen level less than saturation?		4			Review of records/Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#5c	<b>Chemistry</b>						
	Ammonia (un-ionized)		4			Review of records/Discussion	
	Carbon Dioxide			4		No data	Run analysis
	Chlorine			4		No data	Not a significant parameter at this
	pH		4			Review of records/Discussion	site
	Copper		4			Review of records/Discussion	
	Hydrogen Sulfide		4			Review of records/Discussion	
	Iron		4			Review of records/Discussion	
	Zinc		4			Review of records/Discussion	
#5d	<b>Turbidity</b>						
	Does your turbidity meet the criteria?		4			Review of records/Discussion	
#5e	<b>Alkalinity and hardness</b>						
	Does your alkalinity and hardness meet the criteria?		4			Review of records/Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#5f	<b>Nitrite</b>						
	Does your nitrite meet the criteria?		4			Review of records/Discussion	
#5g	<b>Contaminants</b>						
	Aldrin		4			Review of records	
	Endrin		4			Review of records	
	Dieldrin		4			Review of records	
	Heptachlor		4			Review of records	
	Chlordane		4			Review of records	
	Methoxychlor		4			Review of records	
	Lindane			4		No data	Run analysis
	Malathion		4			Review of records	
	Guthion			4		No data	Run analysis

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#5h	<b>Pathogens</b>  What portions of the hatchery have disease-free water?  Adult holding?  Incubation?  Early rearing?  Rearing?  Others?				4        4        4        4	Have had ERM & Ick problems	Do not appear to be serious problems

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#6	<b>Alarm Systems</b>						
	Do the following areas have alarms?						
	Intake?		4			Inspection of facilities/ Discussion	
	Large rearing ponds and adult holding ponds?		4			Ò	
	Raceway headboxes and rearing ponds?		4			Ò	
	Incubation facilities?	4					
	Quarantine areas and facilities?		4				
	Water treatment systems?		4				
	Security?						
			4				
	Are there outside systems and buzzers in on-site residences?						
			4				
	Are water flow alarms checked daily?					Discussion	
			4				
	Are all other alarms checked weekly?					Discussion	
			4				
	Is there a log of alarms for emergencies, tests, and maintenance requirements					Review of records/Discussion	



**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#7	<b>Adult collection and holding facilities</b>						
	Do you meet the adult holding criteria?		4			Review of records/Discussion	
#8	<b>Incubation facilities</b>						
	Type 1: Vertical tray						
	Do you have an adequate number of units for the overall program?		4			Inspection of facilities/Discussion	
#9	<b>Rearing facilities</b>						
	Type 1: Burrows Ponds						
	Do you have an adequate number of units for the overall program?		4			Inspection of facilities/Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#10	<b>Screening facilities</b>						
	Do you meet the approach velocity criteria:	4				Spring or groundwater sources; no intake	
	Are the fish screens regularly cleaned?	4					
	Are rearing containers double screened for fish that should not be released to adjacent water?	4					
#11	<b>Predator control facilities</b>						
	Are your predation control facilities effective?		4			Inspection of facilities/Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#12	<b>Food storage facilities and quality control</b>					
	Does the storage of dry/semi-moist/moist foods follow food manufacturer's recommendations? (dry<12%; semi-moist 12-20%; moist >20% moisture)					
	Does a regional quality control officer oversee production procedures and monitor:					
	Verification by feed manufacturer that ingredients meet specifications?					
	Ensure feeds do not contain unwanted drugs or other additives?					
	Analyze ingredients contained in the final food product to ensure that feed specifications have been met?					
	Are the storage and handling of foods					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
			4			Dry feeds used within 1 month	
			4			Discussion	
			4			Discussion	
			4			Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#13	<b>Release facilities</b>  Do the release facilities ensure that fish are not subjected to adverse conditions?				4	Fish are not volitionally released; present facilities stresses fish too much	Not sure how the release facilities would be improved
#14	<b>Pollution abatement facilities</b>  Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?  Are pollution abatement facilities operated correctly?		4  4			Inspection of facilities/Discussion  Discussion	
#15	<b>Transportation facilities</b>  Are the transport systems adequate to meet IHOT performance measures for transportation practices?	4				No transportation of fish for this program	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#16	<b>Broodstock selection practices</b>						
	Is the donor selection process document attached?	4				Existing program; does not apply	
	Was the donor selection outline followed in selecting the hatchery broodstock?	4				Existing program; does not apply	
	Go to PM #40 in Genetics						
#17	<b>Spawning practices</b>						
	Were the appropriate number of spawners, male/female ratios, and fertilization protocols used?		4			Review of records/Discussion	
	Go to PM #42 in Genetics Section						

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#18	<b>Incubation practices</b>						
	Are specific incubation standards listed in the hatchery operations plan?		4			In hatchery Operations Plan, not IHOT	Include in IHOT Operational Plan
	Are incubation practices written?		4			Review of plan	
	Incubation Type 1: Vertical Tray See PM #8)		4			Review of records/Discussion	
	Do you meet the loading and flow criteria?						

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#19	<b>Rearing practices</b>  Are specific rearing standards listed in the hatchery operations plan?  Are rearing practices written?  Rearing Unit Type 1: Burrows Ponds (see PM 9) Do you meet the density and DI criteria? Do you meet the Loading and FI criteria?		  4  4  4  4			  In hatchery Operations Plan, not IHOT  Review of rearing standards  Review of records/Discussion Review of records/Discussion	  Include in IHOT Operational Plan
#20	<b>Smolt quality</b>  Do you produce a high quality smolt?		  4			  Personal opinion of hatchery management	



**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#21	<b>Fish health management practices</b>  <p>Are the monthly hatchery monitoring visits being conducted? (PM #26)</p> <p>Are the annual broodstock inspections being conducted? (PM #27</p> <p>Is there pathogen-free water and are the sanitation procedures being followed? (PM #28)</p> <p>Are the following water quality parameters within criteria? (PM #5a-5h)</p> <p>Water temperature</p> <p>Dissolved gases</p> <p>Chemistry</p> <p>Turbidity</p> <p>Alkalinity and hardness</p> <p>Nitrite</p>					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
			4			Review of records/Discussion
			4			Review of records/Discussion
					4	No pathogen-free water; cannot use iodophone to treat eggs
			4			Review of records/Discussion
			4			Ò
				4		Ò
			4			No CO2 or chlorine analysis
			4			Review of records/Discussion
			4			Ò

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
						Modify incubation water supply/ discharge piping
						Run analysis
						Run analysis

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#22a	<b>Does hatchery performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas:</b>						
#22a1	<b>Percent smoltification</b>						
	Do you measure percent smoltification?		4			ATPase, condition factor; seawater challenge	
	Did you meet the smoltification criteria?	4				No goal found	
#22a2	<b>Rearing density (prior to release)</b>						
	Did you meet the rearing density criteria just prior to release?		4			Review of records/Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#22a3	<b>Disease condition (at release)</b>  Did you meet all disease regulations just prior to release?		4			Review of records/Discussion	
#22a4	<b>Number (at release)</b>  Did you meet the release number goal?		4			In compliance last 2 years	
#22a5	<b>Size at release</b>  Did you meet the size goal?		4			Close to lower limit in March release	
#22a6	<b>Dates of release</b>  Did you meet the release date goal?		4			Release on-site	
#22a7	<b>Location of release</b>  Did you the release the fish at the specified location?		4			Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#22b	<b>Are fish reared in the subbasin or acclimated in the subbasin?</b>  Are the fish reared in the subbasin?  Are the fish acclimated in the subbasin?		4			Discussion  Discussion	
#22c	<b>Is the release strategy appropriate for the program?</b>			4		Concerns with temperature during May release	Need ability to adjust temperatures prior to release

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#23	<p><b>Transportation facilities</b></p> <p>Do transportation equipment and personnel receive disinfection before and after use?</p> <p>Disinfection of fish tank interior using a solution of 200 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)?</p> <p>Disinfection of fish transport vehicle exterior using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?</p> <p>Disinfection of fish transport vehicle (cab) using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?</p>					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
		4				No transportation used at this facility	
		4				Ò	
		4				Ò	
		4					



**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#23 (cont)	<p><b>Transportation facilities</b></p> <p>Does a pre-loading inspection covering the following: tank water level, pumps or aerators, oxygen injection system settings, displacement gauge, and truck loading/hauling density tables checked and reviewed occur prior to loading the fish in the transport unit?</p> <p>Do hauling criteria include checking the fish 45 minutes to 1 hour after loading occur?</p> <p>When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained approximately 8 ppm?</p> <p>Is water temperature in the transportation unit maintained within 42-48°F range?</p> <p>Do fish releasing procedures include the</p>					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
		4				No transportation used at this facility	
		4				ò	
		4				ò	
		4					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#24	<p><b>Evaluation practices</b></p> <p>Has the hatchery conducted fishery contribution studies to:</p> <p>Determine the requirements for evaluating and improving management programs?</p> <p>Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?</p> <p>Develop guidelines that define if the proper stocks of fish are currently being used?</p> <p>Determine which management units contribute to a specific fishery and the time periods of those contributions?</p>					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
			4			Discussion	
			4			Discussion	
			4			Discussion	
			4			Discussion	
			4			Discussion	
			4			Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#25	<b>Training practices</b>						
	Does the hatchery have a training schedule for its staff?		4			Review of records/Discussion	
	Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		4			Review of records/Discussion	
	Does the hatchery routinely exchange training details between other hatcheries and agencies?		4			Review of records/Discussion	
	Does the hatchery encourage and reward off-duty training of staff?		4			Review of records/Discussion	
	Does the hatchery conduct monthly staff meetings?		4			Review of records/Discussion	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#26	Are monthly hatchery monitoring visits being conducted by a qualified fish health specialist?		4			Review of records/Discussion	
#27	Are all of the functions of the hatchery yearly monitoring visits being completed as described below?		4			Review of records/Discussion	
#28	Is the hatchery following accepted sanitation procedures?						
	<p>Are there any sources of pathogen-free water, especially for incubation and early rearing?</p> <p>Are the hatchery sanitation procedures understood and being followed?</p>				<p>4</p> <p>4</p>	<p>Discussion</p> <p>Inspection of facilities/Discussion. Cannot use iodophone to treat eggs</p>	<p>No major problems</p> <p>Need separate drain system for incubation system when treating eggs; should not be required unless pathology does not request</p>

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#29	<p><b>Are water quality parameters being followed?</b></p> <p>Are the following water quality parameters within criteria? (PM #5a-5h)</p> <p>Water temperature</p> <p>Dissolved gases</p> <p>Chemistry</p> <p>Turbidity</p> <p>Alkalinity and hardness</p> <p>Nitrite</p> <p>Contaminants</p> <p>Go to PM #21</p>						
			4			Review of records/Discussion	
			4			Review of records/Discussion	
				4		CO <sub>2</sub> and chlorine data missing	Run analysis
			4			Review of records/Discussion	
			4			Review of records/Discussion	
			4			Review of records/Discussion	
				4		Lindone & Guthion missing	Run analysis

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#30	<p><b>Are incubation and rearing standards being followed?</b></p> <p>Are the incubation practices being following the IHOT incubation criteria? (PM #18)</p> <p>Are the rearing practices following the IHOT criteria? (see PM #19)</p> <p>Go to Rearing practices, PM #18-PM #19</p>		4			<p>Review of records/Discussion</p> <p>Review of records/Discussion</p>	
#31	<b>Are egg and fish transfer/release requirements met?</b>		4			Discussion	



**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

PM #	Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
		N/A	Yes	?	No		
#32	<b>Is the hatchery's program outlined in a subbasin management plan?</b>  Go to subbasin plan, PM # 1		4			Columbia Basin System Planning Production Plan, U.S. vs. Oregon, Columbia River Fish Management Plan	
#33	<b>Is the hatchery operating under a current hatchery operational plan?</b>  Go to operational plan, PM # 2		4			Review IHOT & Spring Creek 5-Year Plan	
#34	<b>Is a hatchery monitoring and evaluation plan in place?</b>  Go to hatchery monitoring and evaluation plan PM # 3		4			Review hatchery Monitoring and Evaluation Plan	Include Monitoring and Evaluation Plan in IHOT Operational Plan

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#35	<p><b>Does the hatchery program meet requirements established in the regional hatchery policies and subbasin planning documents in the following areas: species, stock, broodstock collection location, broodstock numbers, broodstock collection strategy, and spawning and egg-take protocols.</b></p> <p>Does the hatchery program meet the requirements for the following: (PM #1-PM #2)</p> <p>Species protocols? (PM #4a)</p> <p>Stock protocols? (PM #4a)</p> <p>Broodstock collection location protocols? (PM #41)</p>					
			4			Review of records/Discussion
			4			Review of records/Discussion
			4			Review of records/Discussion
			4			Review of records/Discussion
			4			Review of records/Discussion

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#36	<p><b>Does the hatchery's performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location at release.</b></p>					
	Percent smoltification (PM #22a1)	4				No goal found
	Rearing density (PM #22a2)		4			Review of records/Discussion
	Disease condition (PM #22a3)		4			Review of records/Discussion
	Number at release (PM #22a4)		4			Review of records/Discussion
	Size at release (PM #22a5)		4			Review of records/Discussion
	Date of release (PM #22a6)		4			Review of records/Discussion

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#37	<b>Are fish reared in the subbasin or acclimated in the subbasin?</b>  See PM #22b		4			Discussion	
#38	<b>Is the release strategy appropriate for the program?</b>  See PM #22c			4		Concerns with temperature during May release	Need ability to adjust temperatures prior to release

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

<b>PM #</b>	<b>Description of Performance Measure</b>	<b>Compliance Status</b>	<b>Basis for Compliance or Non-Compliance</b>	<b>Remedial Action Needed for Compliance</b>
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**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#39	<p><b>For new programs, has a broodstock collection plan been developed?</b></p> <p>Is the broodstock collection plan written?</p> <p>For a non-captive broodstock program:</p> <p>Was an unbiased, representative sample collected?</p> <p>Was the recommended number of broodstock collected?</p> <p>For a captive broodstock program:</p> <p>Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?</p>	<p>4</p> <p>4</p> <p>4</p> <p>4</p>				<p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p> <p>Existing Program; does not apply</p>



**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#40	<p><b>For a new program, was the donor selection outline followed in selecting the hatchery broodstock?</b></p> <p>Is a donor selection plan written?</p> <p>Was the donor selection outline followed in the selecting the broodstock?</p> <p>Was the target stock recommended in the donor selection process actually used?</p>						
		4				Existing Program; does not apply	
		4				Existing Program; does not apply	
		4				Existing Program; does not apply	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
#41	<p><b>For existing programs, were the broodstock collection procedures followed?</b></p> <p>Is the broodstock collection plan written?</p> <p>Does the broodstock collection plan follow the guideline:</p> <p>Was an unbiased, representative sample collected?</p> <p>Was the recommended number of broodstock collected?</p> <p>Were the broodstock collection procedures in hatchery operation plan understood and followed?</p>		4			<p>Review broodstock collection plan</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p>	

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#42	<p><b>Were the appropriate number of spawners, male/female ratios, and fertilization protocols used?</b></p> <p>Are the spawning protocols written?</p> <p>Are daily or weekly spawning logs available?</p> <p>Were the appropriate number of spawners used?</p> <p>Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?</p> <p>Was the sex-ratio within the limits given in the performance standards?</p> <p>Were the fertilization protocols followed?</p>		<p>4</p> <p>4</p> <p>4</p> <p>4</p> <p>4</p> <p>4</p>			<p>Review spawning protocols</p> <p>Review of records</p> <p>Review of records</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p> <p>Discussion</p>
		4				Discussion

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No	
#43	<p><b>Is there a genetics monitoring and evaluation program in place?</b></p> <p>Is a genetics monitoring and evaluation program available?</p> <p>Does the plan address the following elements listed in IHOT:</p> <p>Does the program have elements needed to meet evaluation goals 1-4?</p> <p>Has a qualified geneticist reviewed and endorsed the program (goal 5)?</p> <p>Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)?</p> <p>Is it understood and followed by staff?</p>					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**

		N/A	Yes	?	No		
					4	Discussion	Genetics Monitoring and Evaluation plan under development
		4				Ò      Ò	
		4					
		4					

**Table 1 Spring Creek National Fish Hatchery Compliance (Tule Fall Chinook) For Facility Requirements**



## Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control to those that require a change in agency policy or procedures to those that have a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

### The Five Types of Remedial Actions

Type	Description
1	Non-compliance issues resulting from items beyond human control or PM not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but not clearly definable at this time

## Remedial Actions at Spring Creek National Fish Hatchery (Tule Fall Chinook)

This section presents the corrective actions required to bring the Spring Creek National Fish Hatchery Tule Fall Chinook program into compliance with the IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 2).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates ( $\pm 40\%$ ).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

**Table 2. Remedial Actions Required at Spring Creek National Fish Hatchery (Tule  
Fall Chinook)**

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 1</b> - Non-compliance issues resulting from items beyond human control or PM not relevant for this hatchery		
Need better adult returns (the smolt-to-adult goal is 1.5%; the 5 year average for the hatchery is 0.33%)	----	4h
Do not have disease-free water supply (does not appear to be a serious problem)	----	5h
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Develop genetics monitoring and evaluation plan for IHOT Operations Plan	----	43
<b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval		
Monitor chemistry parameters on routine basis	\$200/year	5c,29
Monitor contaminants on routine basis	\$400/year	5g

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Modify incubation water supply to allow water hardening of eggs in iodophor (costs will depend strongly on operational constraints and safety considerations that would be determined in design)	\$150,000	21,28
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but not clearly definable at this time		
Present release facility stresses the fish too much	?	13
Need ability to adjust water temperatures during May releases	?	22c

## Hatchery Contribution to Fisheries, Spawning Grounds and Hatcheries

This section presents the audit findings for the Spring Creek National Fish Hatchery's Tule Fall Chinook contribution of adult fish to fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2, 3, 4, 5, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4-5 years after the fish have been released from the hatchery.

**Table 3. Adult Contribution to Fisheries, Spawning Grounds and Hatcheries -  
Spring Creek National Fish Hatchery (Tule Fall Chinook)**

<b>Year</b>	<b>Fisheries</b>	<b>Spawning Grounds<sup>3</sup></b>	<b>Hatchery<sup>3</sup></b>	<b>Smolt to Adult Survival (percent)</b>
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Data obtained from Missing Production Groups Annual Reports or from the Regional Mark Information System database.

	(Broodyear)	(Broodyear)	(Broodyear)	
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				

## Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the Federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program were estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 4 shows the annual operating expenses for the Spring Creek National Fish Hatchery (Tule Fall Chinook).

**Table 4. Annual Operating Expenses - Spring Creek NFH (Tule Fall Chinook)**

Component	1993	1994	1995
Personnel Costs			
Operational Costs <sup>4</sup>			
Capital Costs <sup>4</sup>			
Indirect Costs <sup>4</sup>			
Lumped Hatchery Costs	\$825,700	\$821,425	\$801,614

The levels of detail for expense information was expanded after the Phase 1 data collection process was completed. This table will be updated at the completion of Phase 2.

If it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Lumped Third-party Costs <sup>5</sup>			
<b>Total Hatchery Costs</b>	<b>\$825,700</b>	<b>\$821,425</b>	<b>\$801,614</b>
<b>Source of Funds</b>			
U.S. Fish & Wildlife Service	100%	100%	100%
Program Production (lb)	---	---	---
Total Production (lb)	---	---	---
Program as Percent of Total	100%	100%	100%
<b>Program Costs</b>	<b>\$825,700</b>	<b>\$821,425</b>	<b>\$801,614</b>

PMs are Performance Measures that were extracted from the IHOT 1995 report. The IHOT Performance Measures are listed in Table 1 in Section 3 in numerical order.